

**REMARKS**

Claims 1, 4-18 are currently pending in the application. By this amendment, claim 1 was amended. No new matter has been added. By the present amendment and remarks, Applicant submits that the rejections have been overcome, and respectfully requests reconsideration of the outstanding Office Action and allowance of the present application.

***Acknowledgement of Cited Items***

Applicants note the Examiner's acknowledgement of Applicant's Amendment on April 4, 2005 was entered on page 2 of the instant Office Action dated April 11, 2005.

Applicants note with appreciation the Examiner's consideration of the documents cited in the Information Disclosure Statement filed on June 28, 2004 by the return of the initialed and signed copy of the PTO-1449 Form accompanying the Information Disclosure Statement.

***Drawings Objections***

The drawings were objected for not showing the at least one overhang being in the parallel and transverse direction. Applicants traverse the objection to the Drawings by the Examiner in that the specification clearly provides the necessary guidance for one of ordinary skill in the art to be able to utilize at least one overhang being in the parallel and transverse direction, see, e.g., Figures 5-7 and 8-11 and paragraphs [0008]-[0009], [0021]-[0022], [0027], [0030]-[0031], [0034] and [0037]-[0038].

Applicants note that Figures 8-10 illustrate a pFET device viewed in the current direction and transverse to the current direction, respectively, while Figure 9 and 11

illustrate an nFET device viewed in the current and transverse to current directions, respectfully.

Applicants submit that it is apparent that Figures 9 and 11 illustrate the features requested by the Examiner, such that the drawings are in compliance with 37 CFR 1.83(a).

Accordingly, withdrawal of the drawing objection is respectfully requested.

The drawings were objected for not labeling Figure 7 as "Prior Art". Applicants traverse the objection to the Drawings by the Examiner in that the Figure 7 is utilized to describe the invention, not the prior art.

As the drawing does not illustrate the prior art, Applicants submit that labeling this figure as such would be improper.

Accordingly, Applicants respectfully requests that the Examiner reconsider and withdraw the objection of the above-noted drawings.

### ***Specification Objections***

The Specification was objected to for lacking antecedent basis for the first shallow trench side being parallel and the second shallow trench side being transverse. Applicants traverse the objection to the Specification. Applicants respectfully direct the Examiner's attention to paragraph [0034] which recites, in part, the shallow trench includes two sides (740 and 750) parallel to the direction of current flow and two sides (760 and 770) transverse to the direction of current flow. Moreover, the specification clearly provides the necessary guidance for one of ordinary skilled in the art to be able to understand a first shallow trench side being parallel and the second shallow trench side being transverse.

Accordingly, Applicants respectfully requests that the Examiner reconsider and withdraw the objection of the above-noted Specification.

***Claim Rejections – 35 U.S.C. § 112 Rejection***

**Claims 1 and 4-18 were rejected under 35 U.S.C. §112, First Paragraph, Enablement, Applicants respectfully transverse this rejection.**

As a preliminary matter, the entire disclosure, including the drawings, provide sufficient disclosure of what is claimed. The Examiner asserts the specification is not enabling for one isolation region or a first shallow trench isolation having a first shallow trench isolation side parallel to the direction of current flow, and having a second shallow trench side in a direction transverse to the direction of current flow. In contrast, the Examiner asserts the description and drawings appear to show “either the shallow trench isolation in the nFET has overhangs, which are all parallel or all transverse”. The Examiner’s assertions are respectfully incorrect.

The Examiner’s attention is directed to paragraph [0007]-[0008], which discloses, in part:

“...at least one shallow trench isolation having at least one overhang selectively configured to prevent oxidation induced stress in a determined portion of the substrate...”

The Examiner’s attention is directed to paragraph [0034], that recites, in part:

“...the shallow trench isolation includes four sides...  
...The shallow trench isolation 710 includes two sides 740 and 750 parallel to the direction of current flow and two sides 760 and 770 transverse to the direction of current flow.  
...Furthermore, the sides may have STI overhangs or may be devoid of overhangs.  
...An overhang on side 740 and/or 750, which are sides parallel to the direction of current flow, is an overhang parallel to the direction of current flow. An overhang on side 760 and/or 770, which are sides transverse to the direction of current flow, is an overhang transverse to the direction of current flow...”

Applicants submit the specification provides for a complete understanding of the

invention to enable one ordinary skilled in the art to make and/or use a particular embodiment (not the "only", or preferred embodiment) of the invention. More specifically, the specification clearly describes *at least one shallow trench isolation having at least one overhang selectively configured to prevent oxidation induced stress in a determined portion of the substrate, and the sides may have STI overhangs or may be devoid of overhangs*. Moreover, the specification discloses shallow trench isolations having at least one overhang interface, so as to prevent oxidation induced by compressive stresses, e.g. paragraphs [0001], [0007]-[0008].

Applicants respectfully note that such language contains a full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

As is indicated in MPEP 2164.01:

"[t]he test of enablement is whether one skilled in the art could make and use the claimed invention from the disclosure coupled with information known in the art without undue experimentation. United States v. Teletronics, Inc., 857 F.2d 778, 8 USPQ2d 1217 (Fed. Cir. 1988); In re Stephens, 188 USPQ 659 (CCPA 1976). The test of enablement is not whether any experimentation is necessary, but whether, if experimentation is necessary, it is undue. In re Angstadt, 190 USPQ 214 (CCPA 1976). An extended period of experimentation may not be undue if the skilled artisan is given sufficient direction or guidance. In re Colianni, 195 USPQ 150 (CCPA 1977) (Miller, J., concurring). The experimentation required, in addition to not being undue, must not require ingenuity beyond that expected of one of ordinary skill in the art. In re Angstadt, supra. For example, in one instance a "few hours" of experimentation to determine process parameters was not considered to be undue in view of the nature of the invention (preparation of oxygenated hydrocarbons). In re Borkowski, 164 USPQ 642 (CCPA 1970). In Tabuchi v. Nubel, 194 USPQ 521 (CCPA 1977) a screening procedure which took 15 calendar days was not considered undue experimentation because the test was both simple and straightforward and because of its demonstrated success in producing the desired result.

Applicants submit that each of the above-noted paragraphs clearly would suffice to

practice the invention, especially in light of the guidance provided by Applicant's complete disclosure, which must be considered in evaluating enablement. In particular, Applicants have indicated in paragraphs pages 7-8:

“...at least one shallow trench isolation having at least one overhang selectively configured to prevent oxidation induced stress in a determined portion of the substrate...”

Applicants also submit that with the above-noted disclosure, there would be no undue experimentation required to enable one ordinarily skilled in the art to practice the invention.

Accordingly, Applicants have defined at least one overhang selectively configured to prevent oxidation induced stress in a determined portion of the substrate, in such a manner to provide one skilled in the art to make and/or use the claimed invention without undue experimentation. Applicants submit that this information coupled with the skill and knowledge that one of ordinary skill in the art sufficient to enable the practice of the claimed invention without undue experimentation.

Applicants remind the Examiner of the guidance provided in MPEP 2164.04 which states that:

“...a specification disclosure which contains a teaching of the manner and process of making and using the invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented must be taken as in compliance with the enabling requirement of the first paragraph of 35 USC112 unless there is reason to doubt the objective truth of the statements contained therein which must be relied on for enabling support.”

In this case, the Examiner has provided no objective evidence to support the asserted lack of enablement.

Accordingly, Applicants respectfully requests that the Examiner reconsider and withdraw the rejection of the above-noted claims under 35 U.S.C. § 112, first paragraph.

### **35 U.S.C. § 103 Rejection**

Claims 7 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over TRIVEDI (U.S. Patent No. 6,583,060) in combination with Jin et al., (U.S. Patent No.

5,940,716) ("JIN"). This rejection is respectfully traversed.

The Examiner asserts that TRIVEDI shows all of the features of the claimed invention except at least one overhang configured to prevent oxidation induced stress in a direction parallel to the direction of current flow for the n-channel field effect transistor, that JIN shows at least one overhang configured in the parallel direction, and that it would have been obvious to modify TRIVEDI to include at least one overhang configured in the parallel direction, as taught by JIN. Applicants respectfully disagree with the Examiner's assertions.

Applicants' independent claim 7 recites, *inter alia*:

"...the first shallow trench isolation side having at least one overhang configured to prevent oxidation induced stress in a direction parallel to the direction of current flow for the n-channel field effect transistor..."

Moreover, Applicants' independent claim 1 recites, *inter alia*:

"...a shallow trench isolation having at least one overhang is selectively configured to prevent oxidation induced stress in a determined portion of the substrate, and wherein the at least one overhang is selectively configured to prevent oxidation induced stress in at least one of a direction parallel to and transverse to a direction of a current flow..."

Applicants submit that TRIVEDI does not show the features of the claimed invention for independent claim 7, as admitted by the Examiner. Further, Applicants submit that no proper combination of TRIVEDI and JIN render obvious the above-noted features of claims 7 and 8, or for that matter claims 1, 4-6 and 9-18.

TRIVEDI discloses a semiconductor substrate (10) having p-channel and n-channel field effect transistors formed thereon and source and drain regions 101 and gate 70 (see Figure 12 and Col. 5, lines 35-55). Further, as admitted by the Examiner, TRIVEDI fails to

disclose *an overhang parallel to or traverse to a direction of current flow, to prevent oxidation induced stress in such directions*, as at least recited in independent claim 7 and independent claim 1. Moreover, TRIVEDI fails to disclose configuring an overhang parallel to or traverse to a direction of current flow, to prevent oxidation induced stress in such directions, as at least recited in independent claim 1.

JIN discloses forming trench isolation regions on a face of a semiconductor substrate, such that the use of trench isolation regions can be formed having a reduced susceptibility to edge defects because the periphery of the trench at the face of the substrate is covered with the electrically insulating material. See Abstract. However, nothing in JIN teaches configuring an overhang in relation to a direction of current flow.

The Examiner asserts JIN shows the first shallow trench isolation side having at least one overhang configured in the parallel direction, reciting all the drawings (Fig.'s 1-24 and the entire document, but does not cite any particular section of JIN as disclosing the above features. Further, the Examiner *suggests* that at least one overhang *may* also be configured in the transverse direction, since the isolation *appears* to surround the active regions, reciting Figure 14 and Col. 2, lines 10-22, Col. 4, lines 10-13, and Col. 5, lines 10-21. However, Col. 2, lines 10-22 addresses the problems in area "A" of the prior art device.

Further, Col. 4, lines 10-13, concerns a portion of JIN directed to a protective layer 102 which is a stress buffer (not related to oxidation). Further still, Col. 5, lines 10-22 is directed to the mask removal (104B and 102A). As a matter of fact, none of the specific sections of JIN indicated by the Examiner discloses or even suggests a configuration to prevent oxidation, as at least recited in independent claim 7 and independent claim 1.

A rejection under 35 U.S.C. § independent 103 requires the Examiner to first

establish a *prima facie* case of obviousness: "The examiner bears the initial burden of factually support any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of non-obviousness." M.P.E.P. § 2142. The Court of Appeals for the Federal Circuit has set forth three element which must be shown for *prima facie* obviousness:

"First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teachings or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)."

Applicants submit that a *prima facie* case of obviousness has not been established because neither the TRIVEDI nor JIN provide any teaching or suggestion that it would have been obvious to modify TRIVEDI by configuring an overhang parallel to or traverse to a direction of current flow, to prevent oxidation induced stress in such directions. Thus, Applicants submit that the only reasonable rationale for modifying the applied art in the manner asserted by the Examiner is through the use of improper hindsight after reviewing Applicants disclosure and claims.

Moreover, as TRIVEDI merely discloses a semiconductor substrate having p-channel and n-channel field effect transistors formed thereon, and provides no teaching or suggestion of configuring an overhang parallel to or traverse to a direction of current flow, to prevent oxidation induced stress in such directions, Applicants submit that the art of record fails to provide the requisite motivation or rationale for combining the TRIVEDI and



JIN in any manner that would render independent claims 7 and 1 obvious.

For these reasons, Applicants respectfully submit that independent claim 7 is allowable over any proper combination of TRIVEDI and JIN. Claims 9 – 11, 15, and 16 are also allowable over TRIVEDI and JIN at least because of their dependency from allowable base claim 7, and because these claims further define the invention over the art of record. Moreover, as independent claim 1 is allowable over any proper combination of TRIVEDI and JIN for the reasons set forth above, claims 4-6 and 12-14 are also allowable over TRIVEDI and JIN at least because of their dependency from allowable base claim 1, and because these claims further define the invention over the art of record. Therefore, withdrawal of the rejection of claims 7 and 8, and indication that all pending claims are allowable is respectfully requested.

### CONCLUSION

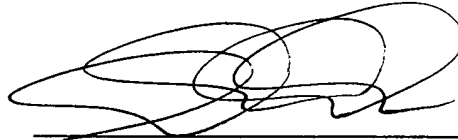
In view of the foregoing amendments and remarks, Applicants submit that all of the rejections have been overcome, and that the claims are patentably distinct from the prior art of record and in condition for allowance. The Examiner is respectfully requested to pass the above application to issue, and to contact the undersigned at the telephone number listed below, if needed.

Further, any amendments to the claims which have been made in this response and which have not been specifically noted to overcome a rejection based upon the prior art, should be considered to have been made for a purpose unrelated to patentability, and no estoppel should be deemed to attach thereto.

Accordingly, reconsideration of the outstanding Office Action and allowance of

the present application and all the claims therein are respectfully requested and now believed to be appropriate.

Respectfully submitted,  
Bruce B. DORIS, *et al.*

A handwritten signature in black ink, appearing to read 'Andrew M. Calderon', is written over a horizontal line.

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